

WHAT IS CLAIMED IS:

1 1. A control system for controlling a variable-geometry mechanism in a
2 turbocharger for an engine, comprising:

3 a logic arrangement structured and arranged to sample a desired control value
4 representing a desired operating condition in which the turbocharger is to be operated,
5 and to sample a previous desired control value representing the desired control value
6 determined in a previous sample period, the logic arrangement being further
7 structured and arranged to determine a first difference parameter as the difference
8 between the desired control value and the previous desired control value and to
9 produce a control signal output based on said first difference parameter, such that the
10 control signal output has a first value when said first difference parameter is greater
11 than a predetermined first threshold and has a second value different from the first
12 value when said first difference parameter is not greater than the predetermined first
13 threshold, and wherein the logic arrangement is structured and arranged to provide the
14 first value as a pulse of predetermined amplitude and duration.

1 2. The control system of claim 1, wherein the logic arrangement is structured
2 and arranged to determine the amplitude and duration of the pulse as a function of
3 said first difference parameter.

1 3. The control system of claim 1, wherein the logic arrangement is structured
2 and arranged to determine the amplitude and duration of the pulse as a function of
3 ambient conditions.

1 4. The control system of claim 2, wherein the logic arrangement is structured
2 and arranged to cause the control signal output to have the second value upon
3 expiration of the duration of the pulse.

1 5. The control system of claim 1, wherein the logic arrangement includes a
2 switch structured and arranged to switch between first and second conditions, the
3 switch in the first condition outputting the control signal output having the first value,
4 the switch in the second condition outputting the control signal output having the
5 second value, the logic arrangement being structured and arranged to provide a
6 switching signal to the switch for switching between the first and second conditions.

1 6. The control system of claim 5, wherein the second value for the control
2 signal output comprises a normal control signal, and further comprising a controller
3 structured and arranged to produce the normal control signal for driving the
4 turbocharger from a current operating condition toward the desired operating
5 condition.

1 7. The control system of claim 6, wherein the controller comprises an open-
2 loop controller.

1 8. The control system of claim 7, wherein the open-loop controller is
2 structured and arranged to produce the normal control signal as a function of engine
3 speed and degree of loading on the engine.

1 9. The control system of claim 7, wherein the open-loop controller is
2 structured and arranged to produce the normal control signal as a function of engine
3 speed and fueling rate of the engine.

1 10. The control system of claim 6, wherein the controller comprises a closed-
2 loop controller receiving a feedback signal and determining the normal control signal
3 based on the feedback signal.

1 11. The control system of claim 10, wherein the logic arrangement is
2 structured and arranged to sample an actual control value representing an actual
3 operating condition of the turbocharger and to determine a second difference
4 parameter as the difference between the desired control value and the actual control
5 value, the logic arrangement producing the control signal output at the first value
6 when either the first difference parameter is greater than the first threshold or the
7 second difference parameter is greater than the second threshold.

1 12. The control system of claim 11, further comprising a sensor operable to
2 detect the actual operating condition and to produce the actual control value and
3 supply the actual control value to the logic arrangement.

4 The control system of claim 1, further comprising a memory structured and arranged
5 to store the previous desired control value and to supply the previous desired control
6 value to the logic arrangement.

1 13. The control system of claim 12, wherein the memory is structured and
2 arranged to filter the stored previous desired control value.

1 14. The control system of claim 1, further comprising an actuator operable to
2 adjust the variable-geometry mechanism, the actuator being arranged to receive the
3 control signal output from the logic arrangement.

1 15. A control system for a variable-geometry turbocharger, comprising:
2 a logic circuit having a first input, a second input, and an output, the logic
3 circuit being structured and arranged to calculate a difference between the first and
4 second inputs and to selectively provide either a first value or a second value to the
5 output depending on the value of said difference, the logic circuit being further
6 structured and arranged to produce a pulse control signal;

7 means for providing a desired control signal to the first input;

8 means for providing a previous control signal to the second input;

9 a controller structured and arranged to provide a normal control signal;

10 a switch receiving the normal control signal and the pulse control signal and
11 having a switch output, the switch being responsive to the logic circuit output and
12 providing the pulse control signal to the switch output responsive to the first value on
13 the logic circuit output and providing the normal control signal to the switch output
14 responsive to the second value on the logic circuit output; and

15 an actuator connected to the switch output, the actuator operable to adjust a
16 variable-geometry mechanism of the turbocharger.

1 16. A method for controlling a variable-geometry mechanism in a
2 turbocharger for an engine, comprising the steps of:

3 sampling a desired control value representing a desired operating condition in
4 which the turbocharger is to be operated;

5 sampling a previous desired control value representing the desired control
6 value determined in a previous sample period;

7 determining a first difference parameter as the difference between the desired
8 control value and the previous desired control value; and

9 supplying a control signal output to an actuator for the variable-geometry
10 mechanism based on said first difference parameter, such that the control signal

11 output has a first value when said first difference parameter is greater than a
12 predetermined first threshold and has a second value different from the first value
13 when said first difference parameter is not greater than the predetermined first
14 threshold, said first value being supplied in the form of a pulse of predetermined
15 amplitude and duration.

1 17. The method of claim 16, wherein the amplitude and duration of the pulse
2 are functions of ambient conditions.

1 18. The method of claim 16, wherein the amplitude and duration of the pulse
2 are determined as a function of said first difference parameter.

1 19. The method of claim 16, further comprising the step of causing the control
2 signal output to have the second value upon expiration of the duration of the pulse.

1 20. The method of claim 16, wherein the second value is determined as a
2 function of engine speed and degree of loading on the engine.

1 21. The method of claim 16, wherein the second value is determined as a
2 function of engine speed and fueling rate of the engine.

1 22. The method of claim 16, wherein the second value is determined based on
2 a feedback signal.

1 23. The method of claim 16, further comprising the steps of:
2 sampling an actual control value representing an actual operating condition of
3 the turbocharger;
4 determining a second difference parameter as the difference between the
5 desired control value and the actual control value; and
6 producing the control signal output at the first value when either the first
7 difference parameter is greater than the first threshold or the second difference
8 parameter is greater than the second threshold.

1 24. The method of claim 16, further comprising the step of storing the
2 previous desired control value in a memory.

- 1 25. The method of claim 24, further comprising the step of filtering the stored
- 2 previous desired control value.